

Atmospheric and Surface Science Research Laboratory

INL researchers are contributing to the scientific understanding of contaminant transport through atmospheric and surface environmental pathways.

Atmospheric and surface pathways account for the vast majority of human and ecological exposure to anthropogenic (man-made) releases of contaminants to the environment. Exposure routes range from direct inhalation to direct contact with residual contamination that has built up or been deposited on soils.

A better understanding of how contaminants cycle through these exposure pathways will help decision-makers to select and permit waste treatment

operations and help stakeholders better understand the relative impacts of contamination sources. Understanding contaminant cycling patterns will also reduce statistical uncertainties in current exposure estimates and risk assessment methods; and provide a scientific basis for developing and evaluating national emissions control regulations.

INL's research is providing information for effective long-term stewardship of the environment by assessing the contribution and buildup of past and current atmospheric emissions to long-term public exposures and future land use. In addition, this research is helping to expand INL's capabilities to support

national-level research priorities in the field of environmental pollutant fate and transport.

Major Areas of Research

Mercury environmental fate and transport - INL and other research laboratories across the nation are conducting fundamental research on quantifying atmospheric mercury sources and environmental cycling to better understand why observed concentrations of this highly toxic air pollutant have been increasing globally.

Multi-variate receptor methods to assess atmospheric transport of air pollutants - Researchers have characterized regional fallout

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The INL participated in a USGS-led snow survey in the Wind River Range, Wyoming, collecting snow samples at 13,000 feet to assess regional background fallout of mercury.



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Science



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of over 40 trace element and common-ion air pollutant constituents and are developing new methods to assess medium-range transport of air pollutants from source areas. Current methods (air dispersion modeling and traditional uni-variate measurement methods) have high levels of uncertainty, or cannot distinguish pollutant contributions from different sources or the background component.

Research Assets and Capabilities

INL is located in a relatively low background area for mercury, and has had two well-documented mercury sources in the past, making this location an ideal setting to study mercury source-receptor relationships. Also, INL is located next door to potentially large natural emission sources of mercury in the Yellowstone geothermal region, an area that has received little attention by the mercury research community.



Flux measurements are made to investigate the potential for re-emission losses of historical calciner-deposited mercury (Hg) in soils.

INL researchers have field deployed a state-of-the-science Tekran® mercury analyzer to provide continuous ultra-low measurements of mercury air concentrations. The system includes a portable meteorological station, which provides important information on the sources of mercury, and a self-contained field trailer that allows deployment of the system to any vehicle accessible locations.

Researchers are also developing a flux measurement system using a dynamic flux chamber and the Tekran® to measure re-emission of deposited mercury from the surface back to the atmosphere. When fully developed, the flux system may be used in research to help quantify non-assessed sources of mercury such as Yellowstone's geothermal areas.

Opportunities

INL welcomes the opportunity to participate in collaborative atmospheric and surface science research with scientists from universities, industry, and federal agencies. Post-doctoral fellowships and staff positions are also possible in the area of atmospheric chemistry, air pollutant measurement techniques, and environmental cycling of contaminants through surface pathways.



Snow is a primary sampling medium because it is a very efficient scavenger of atmospheric mercury (Hg), and because it usually remains on the ground, allowing sampling after the precipitation event.

For more information

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